

Advisory to the exporters of Betel Leaves

In order to address alarming rate of rapid alerts (39 received so far) in betel leaves, the following procedure for the export of betel leaves are to be followed with immediate effect.

1. Follow package of practices as given in Annexure 1.
2. Follow good Hygiene practices as given in Annexure 2.
3. Since soil and water are primary source of contamination of Salmonella, it is important to do soil and water testing, which may be done at APEDA recognized laboratory. (The details are given in http://apeda.gov.in/apedawebsite/HACCP/recognized_laboratories)
4. Export produce to be processed only through APEDA recognized pack houses. (The details are given in http://apeda.gov.in/apedawebsite/Announcements/list_of_pack_house_fruits_vegetables.pdf)
5. Declaration to be given by the exporter (as given in Annexure-3) to the pack house that Package of practices, Good Hygiene practices for betel leaves as given above have been followed.
6. Pack house have to register the farms (as per Annexure-4), confirm that the raw material is sourced from the registered farm only. It has to also verify soil and water test reports of laboratory and declaration from the exporter before allowing betel leaves for exports.

Package of Practices of Betel Leaves (*Piper betle*)

Introduction: The Betel is the leaf of vine. In India, it is known as “paan”. Betel vine is a perennial, evergreen climber which grows in tropics and subtropics. Betel leaf is mostly consumed in Asia and elsewhere in the world by some Asian emigrants. Today betel is grown for local consumption and exports. Major betel leaves growing countries are Sri Lanka, India, Thailand and Bangladesh. Pakistan is the major importer of Sri Lankan betel.



Betel Leaves growing States in India:

Betel leaves are also cultivated in the states of Assam, Andhra Pradesh, Bihar, Gujarat, Odisha, Karnataka, Madhya Pradesh, Rajasthan, West Bengal and Maharashtra.

India Exports Betel Leaves to:

Afghanistan, Australia, Bangladesh, Canada, France, Germany, Hongkong, Kenya, Nepal, United Kingdom, UAE, Saudi Arabia, Oman, Pakistan, Qatar, USA, Yeman and United Kingdom.

In 2013-14, India earned nearly \$ 40 lakh through export of Betel Leaves (Source: Times of India, Jun 25, 2014)

Climatic Requirements:

Tropical climate, high rainfall and a shady place are best for its vigorous growth. Betel is a sun loving plant but produces better quality leaves in the wet zone and intermediate zones rather than in the dry zone. Appropriate shade levels and irrigation are essential for successful cultivation of the crop. Hot dry winds are harmful and retard the growth of the vine.

Season:

Planting season in different Betel Leaves growing states are as follows -

- ❖ Assam - April-May and August-September
- ❖ Andhra Pradesh – September-October
- ❖ Bihar – June-July, September and May-June
- ❖ Karnataka- July-August
- ❖ Maharashtra- July-August and October-November
- ❖ Madhya Pradesh- January-March and September-November
- ❖ Odisha- May-June and September-November
- ❖ West Bengal- June-July and September-October

Soil Requirements:

Soil with good organic matter (i.e. C: N ratio) and drainage system is best suited for betel vine growth. However, it can be grown on different types of soils such as heavy clayey loam, and sandy loam soils.

Soil preparation: Soil should be prepared well by 4–5 ploughings and land should be raised by 5–10cm from the adjacent areas, providing proper gradient on both sides for quick drainage. Afterwards, field beds of suitable size (15cm high and 30cm broad) are prepared. Before planting the cuttings, soil should be sterilized thoroughly.

Soil Sterilization: During hot summer months (March–May), when the soil temperature rises sufficiently, soil is covered using polyethylene sheet in order to destroy inoculum of soil-borne pathogens. For new plantations, application of Carbofuran 3G @ 1.5 kg/ha or neem cake (0.5 tonnes/ha) + Carbofuran (0.75kg/ha) is also recommended to minimize initial soil nematode population. However, Carbofuran should not be recommended in established gardens at any stage because a time gap of 65–70 days as safe waiting period is required between application and harvesting of leaves.

Important Varieties:

Based on shape, size, brittleness and taste of leaf blade, betel vine is classified into pungent and non-pungent varieties.

States	Popular varieties
Andhra Pradesh	Karapaku, Chennor, Tellaku, Bangla and Kalli Patti
Assam	Assam Patti, Awani pan, Bangla and Khasi pan.
Bihar	Desi pan, Calcutta, Paton, Maghai and Bangla
Karnataka	Kariyale, Mysoreale and Ambadiale
Odisha	Godi Bangla, Nova Cuttak, Sanchi and Birkoli
Mahdy Pradesh	Desi Bangl, Calcutta and Deswari
Maharashtra	Kallipatti, Kapoori and Bangla (Ramtek)
West Bengal	Bangla, Sanchi, Mitha, Kali Bangla and Simurali Bangla.

Propagation:

Stem cuttings having 3-5 nodes are used for propagation and these are planted in such a manner that 2-3 nodes are buried in the soil. A single node cutting with a mother leaf is also planted. Cuttings of the apical and middle portions of the vine are used for planting. Betel vine are to be planted 4-5 months earlier.

Cultivation Practices:

Two types of cultivation are practiced in India: Open system of cultivation using support plants and closed system of cultivation using artificial rectangular structures called barejas.

Irrigation:

Since betel vine requires high soil moisture, frequent light irrigation depending upon the season is to be given. Irrigation should be need-based and proper drainage is essential for draining of excess water. Water should be clean and free from microbial contamination.

Standard quality specifications:

There are no specific quality parameters for betel leaves. However, for export of quality betel leaves the following criteria may be considered:-

Size of the leaf – At least 20cm in length and 15cm width

Stem of the leaf must be 2.5-3 cm

Colour - well matured dark green colour leaves

Freshness of the leaves

Insect Pests and diseases –**Insect pests -****Scale insect (*Lepidosaphes cornutus*)**

Identifying characters - Sometime attains pest status in betel vine. They are mostly noticed on the base portion of stems/leaves. The scale insects are either light brown or dark brown in colour.

Damage symptoms - Both the nymphs (crawlers) and adults suck the sap and the infested leaves lose their colour, vigour and exhibit waxy appearance. In case of severe damage the infested leaves become crinkle and dry up ultimately and affected leaves lose their market value.

Management –

- Spraying of NSKE 5% at the infested portion is beneficial. Before spraying matured/marketable leaves should be harvested (*Source: Tamil Nadu Agricultural University Agritech portal-Horticulture*).

Mealy bugs (*Ferrisia virgata*)

Identifying characters – Immature stages or crawlers are yellowish to pale white in colour whereas adult females are apterous, long, slender covered with white waxy secretion.

Symptoms of damage: Presence of white, cottony mealy bugs on the leaves and twigs. They suck the sap from the leaves and growing pints resulting devitalization of the leaves and stunted growth of the plants.

Management:

- Collection and destruction of the damaged plant parts.
- Conservation of the predators viz., *Chrysoperla zastrowi sillemi*, *Coccinella septempunctata*, *Menochilus sexmaculatus*, *Cryptolaemus montrouzieri*
- Spray Fish oil resin soap (FORS) @ 25g/lit or neem oil 0.5% along with teepol 1 ml/lit of water. Before spraying matured/marketable leaves should be harvested (Source: *As recommended by IIVR, Varanasi*).

Note – No insecticide is mentioned against betel vine insect pests as per CIB&RC as on 31/10/2014

Diseases:**Foot rot or Leaf rot or wilt**

Causal organism: *Phytophthora parasitica* var. *piperina*

Symptoms

Vines are infected at all the stages of crop growth. Initially symptoms are associated with sudden wilting. Yellowing and drooping of the leaves from tip downwards are observed on the affected vines. The leaves become dull due to loss of lustre. The affected plants dry up within 2 or 3 days completely. Stems become brown, brittle and dry as stick. The lower portion of the stem near the soil level displays irregular black lesions. Later diseased internodes become soft and undergo 'wet rot', slimy emitting fishy odour. The roots of the infected plants also show rotting. In the young crop, the fungus produces 'Leaf rot' symptoms. The leaves within 2-3 feet height of the vine show the leaf rot symptom.

Management

- Soak the seed vines in Streptocycline* 500 mg/L + Bordeaux mixture* 0.05 %t solution for 30 minutes.
- Collect and destroy the infected vines and leaves.
- Regulate irrigation during the cold weather period.
- Drench the soil with 0.5 per cent Bordeaux mixture at 500 ml/hill during the cool weather period (October-January) at monthly intervals.

(Source: *Tamil Nadu Agricultural University Agritech portal-Horticulture*)

***Note:** No label claim as per CIBRC

Sclerotium foot rot and wilt

Causal organism: *Sclerotium rolfsii*

Symptoms

All stages of vine are susceptible to the disease. Infection starts at the collar region associated with whitish cottony mycelium on the stem and roots. The stem portion shows rotting tissues at the point of attack and the plants show drooping of leaves and dies.

Management

- Removal and destruction of the affected vines along with the roots and should be burnt.
- Apply mustard cake or farmyard manure to soil.
- Drench the soil with Carbendazim.0.1%

(Source: *Tamil Nadu Agricultural University Agritech portal-Horticulture*)

***Note:** No label claim as per CIBRC

Powdery mildew-

Causal organism: *Oidium piperis*

Symptoms

The disease affects the crop at all stages of its growth and infection is mainly noticed on tender shoots and leaves. Whitish powdery growth is seen on both the surface of leaves which later enlarges and cover the major portion of the leaves finally ends up in defoliation.

Management

- Collect and burn the infected leaves.
- Spray 0.2 per cent Wettable Sulphur or dust Sulphur at 25 kg/ha after plucking the leaves (*Source: Tamil Nadu Agricultural University Agritech portal-Horticulture*).

*Note: No label claim as per CIBRC

Anthracnose-

Causal organism: *Colletotrichum piperis*

Symptoms

Leaves show small circular black spots initially which later develops, enlarge with concentric nature and covered with a yellow halo to a size of 2 cm. The affected leaves turn pale yellow and dry up with large black dots in the centre of the spots. Similar spots were seen on the stem portion and as the disease progress leads to girdling o stem finally resulting in withering and drying of entire plant.

Management

- Collect and destroy the infected vines and leaves.
- Spray Ziram* 0.2 % or Bordeaux mixture* 0.5% after plucking the leaves (*Source: Tamil Nadu Agricultural University Agritech portal-Horticulture*).

*Note: No label claim as per CIBRC

Bacterial leaf spot or stem rot –

Causal organism: *Xanthomonas campestris pv. betlicola*

Symptoms

The disease initiates as tiny, brown water soaked specks on the leaves surrounded by a yellow halo, which enlarge later and become necrotic and angular, mostly confined to interveinal areas. Under favourable condition, infection spreads to stem causing blackening of nodes and intermodal region ultimately leads to withering and drying of plants. The infected leaves lose their lustre, turn yellow, show withering and fall off.

Management

- Remove and burn the infected vines and stubbles in the field.
- Regulate irrigation during cold weather season.
- Spray Streptocycline* 400g/L +Bordeaux mixture* 0.25 % at 20 days intervals, after plucking the leaves (*Source: Tamil Nadu Agricultural University Agritech portal-Horticulture*).

*Note: No label claim as per CIBRC

Harvesting and Post Harvest practices:

Generally betel vine is ready for harvest after 2-3 months of planting and thereafter for every 15-25 days. However, harvesting is started when the betel vine is grown up to 1.2 1.8 mt. in length. Leaves are harvested from the lower portion of the stem.

Initially matured leaves are removed in lower parts of the main stem 2-3 times. After that betel leaves are harvested both from main stem and lateral stems. For export market betel is harvested from three weeks intervals and for local market in two weeks intervals.

Harvested leaves to be washed cleaned and graded according to their size and quality. Then they are packed after cutting a portion of the petiole and rejecting the damaged leaves.

For cleaning and washing clean & microbial free water is to be used. Handling workers to sanitize their hands follow proper personnel hygiene.

Post harvest operation to be carried out in APEDA recognized pack house to meet the international standards in terms of quality of produce with quarantine safety.

Annexure-I

Table A. List of recommended insecticides against different insect pests of betel leaf (without label claim)

Name of the insect pest	Common name of pest	Dosage	Recommended by
Malathion 50 EC	Scale insect	1 ml/lit	TNAU*, Coimbatore
Chlorpyrifos 20 EC	Scale insect Mealy bugs	2 ml/lit	TNAU*, Coimbatore
Dimethoate 30 EC	Mealy bugs	2ml/lit	TNAU*, Coimbatore

**http://agritech.tnau.ac.in/horticulture/horti_plantation%20crops_betelvine.html visited on 17/07/2015*

Table B. List of recommended fungicides against different diseases of betel leaf (with label claim) Registered under the Insecticides Act, 1968 AS ON 31.08.2015

Name of the fungicide	Disease	Dosage /ha		
		a.i. (g/ml)	Formulation g/ml	Dilution in water (L)
Copper Oxy chloride (COC) 50% WP	Foot Rot Leaf Rot	1.25	2.5	750-1000

Note: It is important to note that above recommendation with regard to use of Agrochemicals are recommendatory in nature, based on the secondary literature quoted above. The recommendation of the State Government with respect to use of agrochemicals may be followed, as they are fine tuned to the local requirements.

Good Hygiene practices for Betel Leaves

INTRODUCTION:- Regular rapid alerts in Betel Leaves has raised concerns. The following good hygiene practices (GHP) has to be followed:

1. OBJECTIVES OF THE CODE:- This code addresses Good Agricultural Practices (GAPs) and Good Hygiene Practices (GHPs) that will help control microbial, chemical and physical hazards associated with betel leaves from primary production to packing. Particular attention is given to minimizing microbial hazards. The code provides a general framework of recommendations to allow uniform adoption by this sector rather than providing detailed recommendations for specific agricultural practices, operations or commodities.

2. SCOPE, USE AND DEFINITIONS:-

2.1 SCOPE

This code of practice covers general hygienic practices for the primary production and packing of betel leaves cultivated for human consumption in order to produce a safe and wholesome product: particularly for those intended to be consumed raw. It concentrates on microbial hazards and addresses physical and chemical hazards only in so far as these relate to GAPs and GHPs.

2.2 USE

This code focuses upon hygienic issues that are specific to the primary production and packing of betel leaves.

2.3 DEFINITIONS Definitions of general expressions are included in the General Principles of Food Hygiene. For the purpose of this code, the following terms have the definition stated:

Agricultural inputs - any incoming material (e.g. seeds, fertilizers, water, agricultural chemicals, plant support, etc.) used for the primary production of betel leaves.

Worker - any person that undertakes one or more of the following: cultivation, harvesting and packing of betel leaves.

Antimicrobial agents - any substance of natural, synthetic or semi-synthetic origin which at low concentrations kills or inhibits the growth of microorganisms but causes little or no host damage.

Biological control - the use of competing biologicals (such as insects, microorganisms and/or microbial metabolites) for the control of mites, pests, plant pathogens and spoilage organisms.

Composting - a managed process in which organic materials are digested aerobically or anaerobically by microbial action.

Cultivation- any agricultural action or practice used by growers to allow and improve the growing conditions of betel leaves grown in the field (with or without cover) or in protected facilities (shed net, greenhouses and poly houses etc.).

Farm - any premise in which betel leaves are grown and harvested and the surroundings under the control of the same management.

Grower - the person responsible for the management of the primary production of betel leaves.

Harvester - the person responsible for the management of the harvesting of betel leaves.

Hazard - a biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.

Hazardous material - any compound which, at specific levels, has the potential to cause adverse health effects.

Manure - Animal excrement which may be mixed with litter or other material, and which may be fermented or otherwise treated.

Microorganisms -include yeasts, moulds, bacteria, viruses and parasites. When used as an adjective, the term "microbial" is used.

Packer - the person responsible for the management of post-harvest processing and packing of betel leaves.

Packing -the action of putting betel leaves in a package. This may take place in APEDA recognized pack houses.

Primary production - those steps involved in the growing and harvesting of betel leaves such as planting, irrigation, application of fertilizers, application of agricultural chemicals, etc.

Clean water - water that does not compromise food safety in the circumstances of its use.

Potable water - water which meets the quality standards of drinking water such as described in the WHO Guidelines for Drinking Water Quality.

3. PRIMARY PRODUCTION Betel leaves are grown and harvested under sub tropical climatic conditions, using various agricultural inputs like organic fertilizer, farm yard manure etc., Biological, chemical and physical hazards may therefore vary significantly from one type of production to another.

3.2 HYGIENIC PRIMARY PRODUCTION OF BETEL LEAVES

3.2.1 Agricultural input requirements Agricultural inputs should not contain microbial or chemical contaminants to avoid the further multiplication of micro organism like salmonella sps. E. Coli etc.

3.2.1.1 Water for primary production

- Growers should identify the sources of water used on the farm (municipality, re-used irrigation water, well, open canal, reservoir, rivers, lakes, farm ponds etc.). They should assess its microbial and chemical quality, and its suitability for intended use, and identify corrective actions to prevent or minimize contamination (e.g. from livestock, sewage treatment, human habitation).
- Where necessary, growers should have the water they use tested for microbial and chemical contaminants. The frequency of testing will depend on the water source and the risks of environmental contamination including intermittent or temporary contamination (e.g. heavy rain, flooding, etc.).

3.2.1.1.1 Water for irrigation and harvesting Water used for agricultural purposes should be of suitable quality for its intended use.

3.2.1.1.2 Water for fertilizers, pest control and other agricultural chemicals Water used for the application of water-soluble fertilizers and agricultural chemicals in the field should not contain microbial contaminants at levels that may adversely affect the safety of fresh fruits and vegetables.

3.2.1.2 Manure and other natural fertilizers The use of manure and other natural fertilizers in the production of betel leaves should be managed to limit the potential for microbial, chemical and physical contamination.

3.2.1.3 Soil

Soils should be evaluated for hazards. If the evaluation concludes that such hazards are at levels that may compromise the safety of crops, control measures should be implemented to reduce hazards to acceptable levels. If this cannot be achieved by available control measures, growers should not use these soils for primary production.

3.2.2 Facilities associated with growing and harvesting under control condition

For operations where betel leaves are grown under controlled conditions (greenhouses, shed net and poly houses etc.) suitable premises should be used.

3.2.2.1 Location, design and layout

- Premises and structures should be located, designed and constructed to avoid contaminating betel leaves and harboring pests such as insects, rodents and birds.
- Where appropriate, the internal design and layout should permit compliance with good hygienic practices for the primary production of fresh betel leaves, including protection against cross-contamination between and during operations. Each establishment should be evaluated individually in order to identify specific hygienic requirements for each product.

3.2.2.2 Water supply Where appropriate, an adequate supply of potable or clean water with appropriate facilities for its storage and distribution should be available in primary production facilities. Non-potable water should have a separate system. Non-potable water systems should be identified and should not connect with, or allow reflux into potable water systems.

- Avoid contaminating potable and clean water supplies by exposure to agricultural inputs used for growing fresh produce.
- Clean and disinfect potable and clean water storage facilities on a regular basis.
- Control the quality of the water supply.

3.2.2.3 Drainage and waste disposal Adequate drainage and waste disposal systems and facilities should be provided. These systems should be designed and constructed so that the potential for contamination of betel leaves or the potable water supply is avoided.

3.2.3 Personnel health, hygiene and sanitary facilities Hygiene and health requirements should be followed to ensure that personnel who come directly into contact with betel leaves during or after harvesting are not likely to contaminate them. Visitors should, where appropriate, wear protective clothing and adhere to the other personal hygiene provisions in this section.

3.2.3.1 Personnel hygiene and sanitary facilities

Hygienic and sanitary facilities should be available to ensure that an appropriate degree of personal hygiene can be maintained. As far as possible, such facilities should:

- Be located in close proximity to the fields and pack houses, and in sufficient number to accommodate personnel.
- Be of appropriate design to ensure hygienic removal of wastes and avoid contamination.
- Have adequate means of hygienically washing and drying hands.
- Be maintained under sanitary conditions and good repair.

3.2.3.2 Health status People known, or suspected, to be suffering from, or to be a carrier of a disease or illness likely to be transmitted should not be allowed to enter the handling area if there is a likelihood of their contaminating. Any person so affected should immediately report illness or symptoms of illness to the management.

3.2.3.3 Personal cleanliness Workers who have direct contact should maintain a high degree of personal cleanliness and, where appropriate, wear suitable protective clothing and footwear. Cuts and wounds should be covered by suitable waterproof dressings when personnel are permitted to continue working. Personnel should wash their hands when handling betel leaves or other material that comes in contact with them. Personnel should wash their hands before starting work involving the handling, each time they return to handling areas after a break, immediately after using the toilet or after handling any contaminated material where this could result in contamination.

3.2.3.4 Personal behaviour Workers should refrain from behaviour which could result in the contamination of food, for example: smoking, spitting, chewing gum or eating, or sneezing or coughing over unprotected betel leaves.

3.2.4 Equipment associated with growing and harvesting

As required, growers and harvesters should follow the technical specifications recommended by the equipment manufacturers for their proper usage and

maintenance. Growers and harvesters should adopt the following sanitary practices:

- Equipment and containers coming into contact betel leaves should be made of materials that are non-toxic.
- Containers that can no longer be kept in a hygienic condition should be discarded.

3.3 Handling, Storage and Transport

3.3.1 Prevention of cross-contamination During the primary production and post-harvest activities, effective measures should be taken to prevent cross-contamination of betel leaves from agricultural inputs or personnel who come directly or indirectly into contact with betel leaves.

- Equipment and containers previously used for potentially hazardous materials (e.g. garbage, manure, etc.) should not be used for holding betel leaves or have contact with packaging material that is used for betel leaves without adequate cleaning and disinfecting.
- Care must be taken when packing betel leaves in the field to avoid contaminating containers or bins by exposure to, manure or animal/human faeces.

3.3.2 Storage and transport from the field to the packing facility Betel leaves should be stored and transported under conditions which will minimize the potential for microbial, chemical or physical contamination. The following practices should be adopted:

- Storage facilities and vehicles for transporting the harvested crops should be built in a manner to minimize damage to betel leaves and to avoid access by pests. They should be made of non-toxic materials that permit easy and thorough cleaning.

3.4 CLEANING, MAINTENANCE AND SANITATION Premises and harvesting equipment should be kept in an appropriate state of repair and condition to facilitate cleaning and disinfection. Equipment should function as intended to prevent contamination of betel leaves.

DECLARATION

I Mr. /Ms., (Designation) of M/s
..... (Name of the company/firm) Registered with
APEDA with RCMC No....., declare that I have procured the raw
material from the registered farm where Package of practices for
betel leaves as given in Annexure 1 and Good hygiene practices as
given in Annexure 2 of the advisory dated 06/10/2015 have been
followed in the field and during transit, sorting, grading and
storage.

Place: **Director/Managing partner/Proprietor**

Date:

Seal of Firm

Format of Farm Registration

1	Name and address of the Farmer/Grower	First Name & Address of the farmer
	Taluka	
	District	
	State	
	Phone. No. with STD code	
	E-mail address	
2	Plot Reistration No.	
3	Address of the Plot.	
	Survey no. / Gat no.	
	Taluka	
	District	
	State	
4	Total area of the plot, Map of the Plot (please indicate all sides of farm crop grown) Landmark, if any.	
5	Whether Plot is certified for Good Agriculture Practices (GAP) if so attach copy of valid certificate.	
	GAP Certificate No.	
	Date of issue and validity for GAP certificate	
6	Whether any Rapid Alert Notice issued by EU	
7	Date of Planting	
8	Condition of the crop relating to the pest, diseases and overall sanitation of farm	
9	Any advice given to the farmer	
10	Recommendation of the Inspecting Authority (Whether plot is fit for registration /renewal of registration)	
11	Date of Inspection	

It is certified that the above information is correct and true to the best of my knowledge.

Signature of Farmer/Grower

Authorized Signatory

Name of Farmer/Grower

Name:

Place:

Date: